

CA 10

- Addition of hydrogen chloride to butylenes in the gas phase on an aluminosilicate catalyst. B. A. Krentsel and N. A. Pokotilo (Petrochem. Inst., Acad. Sci. U.S.S.R.), *Zhur. Priklad. Khim.* (J. Applied Chem.) 23, 891-8 (1950).
g. C_4H_8 (88% normal, 12% iso) passed over a natural ascanite catalyst, in a 1.0:1.1 mixt. by vol. with HCl (excess HCl) at 100-5°, at the space velocities 23.2, 34.0, 58.0, 80.0, 80.4, 124.0, 144.0 l. l. catalyst hr., gave $\text{C}_4\text{H}_7\text{Cl}$ yields (with respect to C_4H_8) of 41.0, 50.5, 62.7, 70.5 (max.), 61.5, 48.0, 31.5%. At const. space velocity, at 82, 104.5, and 152°, the yields were 62.7, 70.5 (max.), 58.7%. The yield decreases with increasing iso- C_4H_8 in the gas; thus, at 100-5°, with iso- C_4H_8 12.8, 30.0, 50.0, 61.5%, the yields were 79.5, 58.4, 43.0, 19.2%. With up to 12% iso- C_4H_8 , the product consists almost entirely of *iso*- BuCl , with only traces of *tert*- BuCl . The max. productivity of the catalyst is 118 g. $\text{C}_4\text{H}_7\text{Cl}$ hr. l. catalyst. N. Thon

CA

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The addition of hydrogen chloride to butenes in the gas phase over aluminosilicate catalyst. H. A. Kreutzel and N. A. Fokotilo. *J. Applied Chem. U.S.S.R.* 23, 913-17 (1950) (Engl. translation).—See C 1. 45, 1400g. R. M. S.

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✓ Liquid phase saponification of butyl chlorides II A

Krentsel and I. M. Tokhmaki (Petroleum Inst., Acad. Sci. U.S.S.R., Moscow). *Zhur. Priklad. Khim.* (J. Applied Chem.) **23**, 1051-5 (1950). Sapon. of BuCl with $\text{Ca}(\text{OH})_2$ in an autoclave (1 l.) gave, in 4 hrs., the following yields of BuOH, at 100, 155, 165, and 168°, resp.: 11.6% with respect to BuCl charged (39.4% with respect to BuCl reacted), 47.0 (81.5), 41.6 (70.5), and 43.8 (80.0). The optimum temp. of approx. 150° corresponds to a pressure in the autoclave of 10-12 atm. The fall of the yield above 150° is apparently due to dehydration of the BuOH. In the 150-160° range, the yield with respect to the BuCl reacted varies very little with the length of the run, whereas the yield with respect to the BuCl charged is max. at about 4 hrs. The "sp. productivity" of the reactor, i.e. the amt. of BuOH produced, in g./l. hr., decreases with increasing duration of the run; thus, in 1, 3, 5, and 8 hrs., it is 0.2, 7.8, 1.0, and 2.2 g./l. hr. Addn. of a tech. emulsifier, a product of sulfochlorination of the kerosene fraction of a synthetic Fischer-Tropsch fuel, in the amt. of 33.4% of the BuCl charged, had very little effect on the yield with respect to BuCl reacted, but raised by a factor of approx. 1.5 the yield with respect to BuCl charged. The unreacted BuCl can be successfully sapon. in a 2nd run. Iso-BuCl can be sapon. under the same conditions with a yield of 59.5% with respect to iso-BuCl charged at 150° N. Then

1951

CA

Liquid-phase saponification of butyl chlorides. H. A.
Krenzel and I. M. Tokhinski. *J. Appl. Chem. U.S.S.R.*
23, 1117-21 (1970) (Engl. translation).--See C.A. 45,
3707a. H. R.

Nov/Dec 51

USSR/Chemistry - Alcohols
Petroleum

"Advances in the Synthesis of the Lowest Members of the Series of Aliphatic Alcohols From Unsaturated Hydrocarbons," B. A. Krentsel', Moscow

"Uspekhi Khim" Vol XX, No 6, pp 759-775

Points out the economic importance of lower aliphatic alcs and the fact that petroleum cracking gases are a suitable raw material for their production. Discusses production and sayon of alkyl sulfates; direct hydration of olefins, giving information on catalysts used in that reaction (their compn,

193T21

Nov/Dec 51

USSR/Chemistry - Alcohols (Contd)

activation with BF_3 , etc.); "hydrocondensation" of olefins with CO according to Ya. T. Eydu; reaction of acetylene with formaldehyde (under formation of propargyl alc or butynediol); oxidation of propargyl alc to glycerine.

193T21

PA 193T21

RECEIVED, R. A.

USSR/Chemistry - Hydrocarbons
 "Thermal Chlorination of n-Butane," B. A. Krenzel',
 N. A. Pokotilo

PA 187714

Jul 51

"Zhur Prii Khim," Vol XXIV, No 7, pp 726-732

Chlorination with 100% usage of Cl_2 occurs at 300°C. Inert filler lowers chlorination temp, but not temp at which full Cl_2 conversion sets in. At volumetric flow rates from 32-500, with excess of C_3H_8 of 4.5/1 and above, only monochlorides are formed. With lower C_3H_8 excess, monochloride yield does not exceed 80%. With insufficient C_3H_8 excess, dichlorobutanes are formed, which were not investigated.

187714

USSR/Chemistry - Hydrocarbons (Contd)

Jul 51

The monochlorides are 1- and 2-chlorobutane, formed approx in 1 : 1.64 ratio. 100% yield of dichlorobutane is obtained with use of catalysts such as active carbon and askanite in pure state or impregnated with $CuCl_2$. Chlorination of C_4H_{10} under same conditions yielded mixt of n-propyl and i-propyl chlorides with high b p.

187714

KRENZEL, B. A.

Krentsel, B.A.

1595. CHEMICAL UTILIZATION OF PETROLEUM HYDROCARBON GAS 3.
(KHIMICHESKOE IZPOL'ZOVANIIE NEFTYANYKH GIDROKARBONNYKH GAZOV). Krentsel, B.A.
and Krentsel, B.A. (Moscow Acad. Sci. U.S.S.R., 1952, 14pp., 6.75 rub).
This book deals with the use of hydrocarbon gases in the production of gasoline,
synthetic lubricants, synthetic rubber, oxygen compounds, chlorination and
nitration products. (D295785).

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USSR/Chemistry - Petroleum

1 Jul 52

"The Thermal Stability of Butyl Chlorides," B. A. Krentsel', N. A. Pokotilo, Petroleum Inst, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXV, No 1, pp 103-105

Studied the thermal stability of 1-chlorobutane, 2-chlorobutane, isobutyl chloride, and isooctyl chloride. Found that while contact with an inert surface inhibits decomposition, the catalyst ascarite greatly increases decomposition. The absence of chlorine in the end products and the presence of HCl indicates that the decomposition consists of the removal of HCl, leaving an olefin. The position of the chlorine atom in the molecule has

224T14

a greater effect on its thermal stability than the structure. Presented by Acad A. V. Topchiyev
5 May 52.

224T14

KRENTSEL', B.A.

KRENTSEL', B. A.

PA 227216

USSR/Chemistry - Hydrocarbons,
Butane

1 Aug 52

"Some Kinetic Principles in the Thermal Chlorination of Normal Butane," Academician A.V. Topchiyev, B.A. Krentsel', L.N. Andreyev

"Dok Ak Nauk SSSR" Vol 85, No 4, pp 823-826

The extent to which the utilization of chlorine for the thermal chlorination of n-butane in a flow process is dependent on the time the reagents remain in the reaction space and on the temp was investigated. The activation energy of the chlorination of butane was calcd from exptl data and found to be 39,000 cal/mole.

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KRENTSEL', B. A.

USSR/Chemistry - Fuels, Alkylation

11 Sep 52

"The Thermal Process of the Destructive Alkylation of Pentane," Ya. M. Paushkin, Acad
A. V. Topchiyev, B. A. Krentsel', I. M. Tolchinskiy, Inst of Petroleum, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 86, No 2, pp 321-323

The destructive alkylation of pentane," at high temps and pressures without the use of catalysts was carried out in a rotating autoclave. The optimum temp for converting pentane into liquid, high-boiling hydrocarbons lies between 450-460°; the pressure for this temper is 250-310 atm. The optimum time for the reaction is 2 hrs. Prolongation of time, as well as increase in temp, leads to formation of gaseous products. The hydrocarbons formed during the thermal conversion of pentane are a result of destructive alkylation, cyclization, and cracking of pentane with subsequent polymerization of the unsatd hydrocarbons.

PA 235T27

1. TORCHINEV, A. V. , KRENTSEL', E. A. , RAUSHKIN, YA. M. , TOLCHINSKIY, I. M.

2. USSR (600)

4. Pentane

7. High temperature destructive alkylation of pentane in the presence of oxidic catalysts. Dokl. AN SSSR 86 no. 4. '52.

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

USSR/Chemistry - Chlorination
Hydrocarbons

Dec 52

"Thermal Chlorination of Isobutane," Acad A. V. Topchiyev, B. A. Krentsel', and L. N. Andreyev

"DAN SSSR" Vol 87, No 6, pp 999, 1000

The effect of the ratio of hydrocarbon to Cl on the yield of monochlorobutanes was found to be considerably less than in the case of the chlorination of n-butane. It was also found that raising the vol velocity resulted in an increase

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in the yield of monochlorobutanes. The activation energy of the chlorination of isobutane is 20,000 cal/mole, which is close to that of n-butane.

24077

PA 24077

KRENTSEL', B. A.

KRENTSEL, R.A.

Transformation of paraffins into liquid hydrocarbons and
gas at 250-350 atmospheres and 400-500°. A. V. Kuchiev,
G. M. Pashkin, B. A. Krentsel, and I. M. Tolstomak,
Bull. Acad. Sci. U.S.S.R., Div. Chem. Sci. 1953, 237-42.
See C.A. 47, 10307d. H. L. H.

Journal of Applied Chemistry
June 1954
Fuel and Fuel Products

✓ Conversion of pentane to liquid hydrocarbons and gas at 250–360 atmospheres and 400–500°. A. V. Lebedev, Ya. M. Panchkin, B. A. Krut'ko, and I. M. Tolchinskii (*Izv. Akad. Nauk SSSR, Khim. Tsvet.*, 1953, No. 2, 260–263).
In the absence of a catalyst, n-pentane undergoes destructive alkylation, cyclisation, cracking, and polymerisation, whilst on various oxide catalysts (Al_2O_3 , Cr_2O_3 , etc.) large quantities of branched-chain hydrocarbons and naphthenes, including pentamethylenes, are formed; the % conversion is about the same, at the same temp., with or without catalyst. R. C. MURRAY.

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③ AM

1. NEKRASOV, A.S.; KRENTSEL', B.A.
2. USSR (600)
4. Hydrocarbons
7. "Chemical utilization of petroleum hydrocarbon gases." A.S. Nekrasov, B.A. Krentsel',
Reviewed by B.A. Kazanskiy, YA. T. Eidus, Usp.khim. 22 no. 4, 1953.

9. Monthly List of Russian Accessions, Library of Congress, APRIL 1953, Uncl.

KRENTSEL, B. A.

USSR/Chemistry - Alkylation

11 Sep 53

"Alkylation of Isopentane With Isopropyl Chloride and With Tertiary Butyl Chloride in the Presence of Sulfuric Acid," B. A. Krentsel', Acad A. V. Topchiyev, and L. I. Andreyev

DAN SSSR, Vol 92, No 2, pp 319-322

Studied the alkylation of isopentane (I) with isopropyl chloride and with tert butyl chloride using H_2SO_4 as a catalyst. Noted the effect of the molar ration between I and the alkylating agent, the

269T15

effect of reaction time on the yield, the conc of the acid, and the characteristics of the reaction product.

KRENTSEL', B. A.

USSR/Chemistry - Catalysts

21 Sep 53

"The Complex Aluminum Chloride-Sulfuric Acid as a Catalyst for Alkylating Isopentane with Isopropyl Chloride or Tertiary Butyl Chloride," Acad A. V. Topchiyev, L. N. Andreyev and B. A. Krentsel'

DAN SSER, Vol 92, No 3, pp 577-580

Studied activity of the above catalyst in the alkylation of isopentane with isopropyl chloride by determining molar ratios, reaction time, amount of catalyst, and characteristics of the alkylate. Also used the catalyst for the alkylation of isopentane with tertiary butyl chloride. Found that within the interval of 1.5-4.5 hrs, time has very little effect on the yield. The relationship between the amount of catalyst used and the product yield can be expressed by a log curve.

268T2

KRENTSEL, B.I.

Alkylation of benzene by isopropyl chloride in the presence of the complex of aluminum chloride with sulfuric acid and isomerization of propyl chloride. A. V. Teplov, B. A. Krentsel, and L. M. Andreyev. *Doklady Akad. Nauk SSSR*, 1964, 161, 781-4 (1964); cf. *Chem. Abstr.* 59, 16221. Alkylation of C_6H_6 by the $AlCl_3(H_2SO_4)$ -iso-PrCl system was examined. In a 4.5-hr. run the yield of products calculated on PrCl declines with increase of the molar proportion of PrCl relative to C_6H_6 , especially in the interval of the ratio $C_6H_6/PrCl$ from 3:1 to 1:1. As the proportion of the hydrocarbon rises, the relative yield of dialkylation product increases in comparison with the monoalkylation product. With a 3:1 molar ratio of reactants an increase of the amt. of catalyst from 5 g. to 20 g. per mole of reactants leads to a decline of dialkylation products and increase of monoalkylation product. The yield of the product varies linearly with time in expts. ranging from 0.75 to 4.5 hrs. When PrCl was kept with the above catalyst with stirring, it was not isomerized to iso-PrCl (our results are given graphically). $AlCl_3$, on the other hand, led to isomerization which, even in 5 min., was nearly complete, along with formation of polymeric substances in yields from 4% to 24.5% depending on the duration and the amts. of the catalyst. This isomerization is irreversible and iso-PrCl is not isomerized, but does yield polymeric products slowly. G. M. Kosolapoff

KRENTSEL, B. A.

USSR.

145. PRINCIPLES OF SYNTHESIS OF ALIPHATIC ALCOHOLS FROM PETROLEUM HYDROCARBONS. (KRENTSEL, B. A. ALIFATICHESKIE SPIRITY IZ PEFITANYH UPLEKOVANYH).
 Krentsel, B. A. (Moscow Acad. Sci. U.S.S.R., 1954, 100 p., 6 refs; abstr.
 in VESTN. ANS. Nauk SSSR (Bull. Acad. Sci. U.S.S.R.), Aug. 1954, 132). Work
 is reported on the synthesis of the lower aliphatic alcohols from petroleum
 hydrocarbon gases. Methods described include sulphuric acid and direct
 hydration of alkenes, hydrolysis of alkyl chlorides, oxidation of hydrocarbons,
 and new methods of synthesis. Tables are given of the physical and chemical
 constants for the lower aliphatic alcohols.

KRENTSEL', B. A.

"New Methods of Alcohol~~s~~ Synthes~~is~~s" (Novyye metody synteza spirtov) - Chapter 5 of the book by the same author - "Fundamentals of the Synthesis of Aliphatic Alcohols from Petroleum Hydrocarbons", USSR Acad. Sci, Moscow, 1954. pp 150-173.

Translation of Chapter 5, D 207771, 4 Apr 55

KRENTSEL', B. A.

AID - P-106

Subject : USSR/Chemistry
Card : 1/1
Authors : Topchiyev, A. V., Krentsel', B. A., and Andreyev, L. N.,
Moscow
Title : Interaction of Alkyl Chlorides with Paraffinic and
Aromatic Hydrocarbons
Periodical : Usp. Khim., 23, no. 1, 27-44, 1954
Abstract : Review of literature and of some patents on reactions
of alkyl chlorides with various hydrocarbons. Catalysts
for alkylation of aromatic hydrocarbons mentioned:
aluminum chloride, metallic aluminum, aluminum amalgam,
and the complex $AlCl_2 \cdot HSO_4$. Catalysts for alkylation
of isoparaffins mentioned: $AlCl_3$, solution of $AlCl_3$
in nitroparaffins, sulfuric acid, and the complex
 $AlCl_2 \cdot HSO_4$. Effect of alkyl halides on the octane
numbers of fuels is noted. 63 references (22 U.S.S.R.):
1882-1953. 7 tables, 10 graphs.
Institution : None
Submitted : No date

KRENTSEL', B. A.

USSR/ Chemistry - Alkylation

Card 1/1 : Pub. 22 - 19/44

Authors : Krentsel', B. A.; Topchiev, A. V., Academician; and Andreev, L. N.

Title : Alkylation of benzene with n-propyl chloride and n-butyl chloride in the presence of the $AlCl_2 \cdot HSO_4$ complex

Periodical : Dok. AN SSSR 98/1, 75-78, Sep 1, 1954

Abstract : The alkylation of benzene with normal, primary alkyl-chlorides in the presence of the $AlCl_2 \cdot HSO_4$ complex as a catalyst was investigated. The alkylation reaction products derived and their physico-chemical properties, are described in tables. It was established that the $AlCl_2 \cdot HSO_4$ catalyst used in the alkylation of benzene causes no isomerization of the alkyl chlorides as is the case with $AlCl_3$. Two USSR references (1951 and 1953). Tables; graphs.

Institution :

Submitted : June 25, 1954

KRENTSEL', B. A.

USSR/ Chemistry - Reaction processes

Card 1/1 Pub. 22 - 23/48

Authors : Topchiev, A. V., Academician; Andreyev, L. N.; and Krentsel', B. A.

Title : Reaction of naphthalin with isopropyl chloride in the presence of aluminum chloride sulfuric acid complex.

Periodical : Dok. AN SSSR 98/3, 411-414, Sep 21, 1954

Abstract : Experiments were conducted with commercial naphthalin and especially prepared isopropyl chloride to determine their reaction in the presence and in the absence of inert solvents. The reaction between the naphthalin and the isopropyl chloride in the presence of $AlCl_3 \cdot HSO_4$, as well as the process of naphthalin alkylation with the isopropyl chloride, are described. The physico-chemical properties of the reaction products obtained are listed. Five references: 4-USSR and 1-USA (1929-1954). Tables; graphs.

Institution : ...

Submitted : June 25, 1954

KRENTSEL', B.A.

USSR/ Chemistry - Catalytic conversion

Card 1/1 : Pub. 22 - 23/49

Authors : Topchiev, A. V., Academician; Tolchinskiy, I. M.; and Krentsel', B. A.

Title : Effect of pentenes and boron fluoride on the conversion of pentane over an aluminum silicate catalyst

Periodical : Dok. AN SSSR 98/4, 597-600, Oct. 1, 1954

Abstract : The effect of pentene additions on the yield of pentane conversion products, was investigated at high temperatures and pressures in the presence of an $Al_2(SiO_3)$ catalyst. The promoting effect of BF_3 during the conversion of pentane over an $Al_2(SiO_3)$ catalyst, was also studied. Results obtained during pentane conversion over an $Al_2(SiO_3)$ catalyst in the presence of a pentene addition and conversion over an identical catalyst saturated with BF_3 , are shown in tables. Five references: 3-USSR; 1-USA and 1-English (1946-1952). Tables; graphs.

Institution : ...

Submitted : June 25, 1954

TOPCHIEV, A.V.; KRENTSEL', B.A.

[Study of the chlorination of gaseous paraffin hydrocarbons
and certain conversions of alkyl chlorides] Issledovaniia v
oblasti khlorirovaniia gazoobraznykh parafinovykh uglevodo-
rodov i nekotorykh prevrashchenii alkilkhloridov; doklady na
IV Mezhdunarodnom neftianom kongresse v Rime. Moskva, Izd-vo
Akademii nauk SSSR, 1955. 66 p. (MLBA 8:10)
(Paraffins) (Chlorination) (Alkyl chlorides)

KRENTSEL, B. A. and TOPCHIEV, A. V.

"A Study of the Chlorination of Gaseous Paraffin Hydrocarbons and Certain Transformations of Alkyl Chlorides," Publishing House of Acad. Sci. USSR, Moscow, 1955.

A report presented at the 4th World Petroleum Congress of the Permanent Petroleum Congress, Rome, Italy, 6-15 June 1955.

A-45189

KRENTSEL, B.A.

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✓ 5196. ROSE PROBLEM IN THE CHEMICAL TREATMENT OF PETROLEUM HYDROCARBONS.
Topchier, A.Y. and Krentsel, B.A. (Vestn. Akad. Nauk SSSR (J. Acad. Sci.
U.S.S.R.), June 1955, 34-36). Review of possible developments in the U.S.S.R.
petrochemicals industry. Fu

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Krentzel, B.A.

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✓ Some regularities in reactions of chlorination of lower paraffin hydrocarbons and transformations of chloro derivatives. H. A. Krentzel, *Voprosy Khim. Kinetiki, Kataliza i Reaktsionnogo Spetsializatsii, Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1955, 383-401. — A brief review of literature on chlorination is given (21 references). Chlorination of C_4H_{10} was studied at 210-60°. Complete utilization of Cl_2 is reached at 330° and the reaction begins at lower temp. in a reactor filled with inert filler than in an empty one under 250°, but above 250° the empty tube is more effective. Passage of $BuCl$ at 220-400° over inert tube filler results in less decomposition than in the case of an empty tube; the decomposition of $BuCl$ and HCl only; clay or Fe sharply accelerate decomposition of $BuCl$; Me_2SiCl_2 is attacked more readily than $BuCl$ in 170-370° interval. Activation energy for chlorination of C_4H_{10} is 29,000 cal./mole without catalyst, 17,000 with inert filler, 14,700 with Al_2O_3 , 8,200 with silica gel, 4,350 with $SiO_2 \cdot CuCl_2$ and under 4000 with Fe. Fe, Bi, Pb effectively lowers the chlorination temp. In photochem. chlorination of C_4H_{10} with 3-10-fold excess of RII there always takes place a formation of products of further chlorination. The space efficiency of the photochem. process is 50% higher than that of thermal chlorination; lowered reaction temp. in the

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Some regularities in
 Fischer-Tropsch reaction tends to increase the yield of dihydro-
 naphthalene. The best yield of H_2NCl was attained at 52° with
 5.0:1 H_2NCl ratio. Alkylation of $\text{iso-C}_4\text{H}_{10}$ with iso-PrCl in
 the presence of H_2SO_4 gave 18% hexanes, 8% heptanes, 60%
 octanes, and some higher hydrocarbons. The octanes
 were 2,4-, 2,5-, and 2,6-dimethylhexanes and 2-methyl-3-
 ethylhexane. The reaction shows a definite induction
 period and cannot be added to cleave RCl into HCl .
 and C_4H_8 ; 100% H_2SO_4 has the best activity as a catalyst.
 Alkylation of $\text{iso-C}_4\text{H}_{10}$ with iso-PrCl in the presence of Al -
 $(\text{H}_2\text{SO}_4)_3\text{Cl}_3$ gave 18% hexanes, 22% heptanes, and 60% oc-
 tanes; with Me_2CCl_2 the reaction with $\text{iso-C}_4\text{H}_{10}$ shows inde-
 pendence of yield of final product on time (1.5-4.5 hrs.) and
 a logarithmic dependence of yield on the amount of catalyst.
 The complex catalyst does not isomerize PrCl . iso-PrCl
 and C_4H_8 with $\text{Al}(\text{H}_2\text{SO}_4)_3\text{Cl}_3$ gave nearly 100% tetralinopro-
 pylanthrene. Freshly prepd. catalyst gave very poor
 yields, but an aged catalyst is very effective. G. M. K.

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TOLCHINSKIY, I.M.; KRENTSEL', B.A.; TOPCHIEV, A.V.

Destructive alkylation of benzene with pentane. Izv. AN SSSR. Otd.
khim. nauk no. 3:512-521 My-Je '55. (MLRA 8:9)

1. Institut nefti Akademii nauk SSSR.
(Alkylation) (Benzene)

KRENTSEL', V. A.

USSR/Chemistry - Hydrocarbon refining

Card 1/1 Pub. 124 - 5/32

Authors : Topchiyev, A. V., Academician, and Krentsel', V. A., Cand. of Techn. Sc.

Title : Certain problems of chemical refining of petroleum hydrocarbons

Periodical : Vest. AN SSSR 25/6, 34-38, June 1955

Abstract : The problems involved in the development of industrial petro-chemical synthesis - production of alcohols, aldehydes, ketones, olefin oxides and other oxygen containing compounds, chlor-derivatives of hydrocarbons, various alkylated hydrocarbons, nitro-derivatives of hydrocarbons, etc. - are analyzed. It is pointed out that the thorough knowledge of chemistry and the introduction of progressive petroleum refining methods became possible only as a result of modern chemical science - theory of catalysis, catalytic conversion of hydrocarbons, etc.

Institution :

Submitted :

AID P - 3747

Subject : USSR/Chemistry

Card 1/1 Pub. 152 - 11/22

Authors : Topchlyev, A. V., M. V. Kurashev, and B. A. Krentsel'

Title : Synthesis of isopropylbenzene by means of alkylation
with $\text{AlCl}_3 \cdot \text{H}_2\text{SO}_4$

Periodical : Zhur. prikl. khim. 28, 9, 976-981, 1955

Abstract : The synthesis of isopropylbenzene from propylene and
benzene (ratio, 1:2) was carried out in the presence
of 15% catalyst, with a supply of 7.5 l./hr., at 25-
30°C. The chemical composition of the alkylates
obtained was determined (mono-, di-, tri-, and
tetraisopropylbenzenes). Five tables, 33 references,
10 Russian (1936-1953).

Institution : None

Submitted : J1 21, 1954

KHENTSEL', B.A.; LOKTEV, S.M.

Natural gas as a source of energy and chemical raw materials.
Priroda 44 no.11:28-35 N '55. (MLRA 9:1)
(Gas, Natural)

TOPCHIN, A.V., akademik, otvetstvennyy redaktor; KAZANSKIY, B.A., akademik, zamestitel' otvetstvennogo redaktora; OFITSEROV, V.V., redaktor; KHENTSEL', B.A., kandidat tekhnicheskikh nauk, redaktor; KURASHOV, M.V., kandidat tekhnicheskikh nauk, redaktor; KARAPETIAN, Sh.A., redaktor izdatel'stva; SHCHUKIN, V.V., redaktor izdatel'stva; MAKUN, Ye.V., tekhnicheskii redaktor

[Chemical processing of petroleum hydrocarbons; proceedings of a conference] Khimicheskaya pererabotka neftyanykh uglevodorodov; trudy soveshchaniya. Moskva, Izd-vo Akademii nauk SSSR, 1956. 654 p. (MLRA 9:12)

1. Vsesoyuznoye soveshchaniye po kompleksnoy khimicheskoy pererabotke neftyanykh gazov.
(Petroleum—Refining) (Hydrocarbons)

KRENTSEL', B.A.

"Status and Tasks of Scientific Research on the Chlorination
and Nitration of Gaseous Hydrocarbons," Khimicheskaya Pererabotka
Neftyenykh Uglevodorov (Chemical Conversion of Petroleum Hydrocarbons),
Academy of Sciences USSR, Moscow, 1956, pp 277-288

, Abstract in Sum 1429

KRENTSEL' B.A.

I-13

USSR/Chemical Technology - Chemical Products and Their
Application. Treatment of natural gases and petroleum.
Motor fuels. Lubricants.

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 12927

Author : Topchiyev A.V., Krentsel' B.A.
Title : Principal Trends In Chemical Processing of Petroleum
Hydrocarbons

Orig Pub : Khim. nauka i prom-st', 1956, 1, No 3, 248-258

Abstract : A review of the present state of petroleum-chemical
synthesis and the principal trends in its development
-- preparation of oxygen-containing products, chlorina-
ted derivatives of hydrocarbons, polymerization of un-
saturated hydrocarbons. Considered are the sources of
raw materials for petroleum chemical synthesis -- ther-
mal conversion of heavy petroleum residues, high tempe-
rature processes of treatment of gaseous paraffin hy-
drocarbons, utilization of liquid petroleum hydrocarbons,

- 238 -

Card 1/2

USSR/Chemical Technology - Chemical Products and Their I-13
Application. Treatment of natural gases and petroleum.
Motor fuels. Lubricants.

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 12927

procedures for separation of mixtures of hydrocarbons.

Bibliography 28 references.

Card 2/2

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ANISONYAN, A.A.; KRENTSEL', B.A.

~~Chemical products from natural and casing-head gases. Gaz.prom.~~
no.4:26-30 Ap '56. (MLRA 10:1)
(Gas, Natural) (Chemistry, Technical)

KRENTSEL, B. A.

USSR/Chemical Technology. Chemical Products and Their I-14
Application--Treatment of natural gases and
petroleum. Motor fuels. Lubricants.

Abs Jour: Ref Zhur-Khimiya, No 3, 1957, 9285

Author : Krentsel, B. A.

Inst : Academy of Sciences USSR

Title : Expanding the Raw Material Base of the Petro-
chemical Industry

Orig Pub: Vestn. AN SSSR, 1956, No 6, 133-135

Abstract: A survey of the reports and transactions of the
meeting of the scientific and technical council
of the Praesidium of the Academy of Sciences USSR
on 26 March 1956 at which the chemical processing
of petroleum hydrocarbons, the status of the pro-
duction of unsaturated gaseous hydrocarbons from
petroleum crude, and the future development of
scientific research work were discussed.

Card 1/1

KRENTSEL', B.A. (Moskva); LOKTEV, S.M. (Moskva)

Production of chemicals from petroleum. Khim.v shkola 11 no.4:
7-18 J1 '56. (Petroleum products) (MLRA 9:9)

KRENTSEL, B. A.

Methods of polymerizing ethylene and its homologues. A. V. Topchey and B. A. Krentsel (*Usp. Khim.*, 1956, 25, 921-932).
 Patent literature and recent research on low-pressure polymerization of ethylene is reviewed including use of catalysts of the types NaAlEt_4 , $\text{Na}(\text{AlEt}_2)_2$, $\text{Mg}(\text{AlR}_2)_2$ and $\text{RMg}(\text{AlR}_2)_2$, where $\text{R}=\text{CH}_3$ or C_2H_5 . Methods for the prep. of AlEt_3 and similar catalysts are enumerated. Polymerization of α -olefins with 5-7 C by use of AlMe_3 and TiCl_4 is also discussed, with concluding chapters on irradiation. (44 references.)
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KRENTSEL', B.A.; LOKTEV, S.M.

~~Polyethylene. Priroda 45 no.10:14-22 0 '56.~~
(Ethylene)

(MLRA 9:11)

Krentsel, B.A.

Thermal chlorination of propane. B. A. Krentsel, A. V. Topchik, and D. E. Il'ina (Peirblech Inst., Moscow). Doklady Akad. Nauk S.S.S.R. 107, 69-72 (1956). — Chlorination of C_3H_8 was performed in a flow-type hot-tube installation. With 2:1 molar ratio of C_3H_8 to Cl_2 at space velocity 300 hr.⁻¹ a 100% utilization of Cl_2 takes place at 300° and is substantially complete in 263-298° region. Broken glass packing lowers temp. of considerable reaction to about 230-40°, but complete reaction still requires 300°. At 300° variation of space velocity from 11 to 85 hr.⁻¹ has little effect on total product yield; increase of molar proportion of C_3H_8 lowers the relative yield of di- and trichlorides. At 4:1 molar ratio a variation of temp. from 300° to 400° slightly raises the yield of dichlorides, while at 2:1 ratio the yield of dichlorides rises slightly. At 300° at 4:1 molar ratio over 80% yield of monochlorides is obtained, with this being proportioned 42.8% iso-PrCl and 57.2% PrCl. Results are shown graphically.

G. M. Kosolapoff

KRENTSEL, B. A.

USSR/Organic Chemistry - Synthetic Organic Chemistry, E-2

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61467

Author: Topchiyev, A. V., Krentsel, B. A., Andreyev, L. N.

Institution: None

Title: Alkylation of Chlorobenzene with Isopropylchloride in the Presence of the Complex $AlCl_3 \cdot HSO_4$

Original

Periodical: Dokl. AN SSSR, 1956, 107, No 2, 265-268

Abstract: There is gradually added to C_6H_5Cl (I) and $AlCl_3 \cdot HSO_4$ (II) the $(CH_3)_2CHCl$ (III), the mixture is left at $30-35^\circ$ then decomposed with water and the hydrocarbon layer is fractionated. Two fractions of starting materials are separated and 3 fractions of alkylate: (1) BP $145-170^\circ$, (2) BP $170-210^\circ$, isopropylchlorobenzene, (3) BP $210-240^\circ$, polyalkylated I. Yield of alkylate with I:III ratios from 1:1 to 4:1 in presence of 10 g II per 1 mol III is $\sim 71\%$ and the amount of fraction (2) in alkylate increases from 40 to 70% while fraction (3) decreases correspondingly from 16 to 4%. On

Card 1/2

USSR/Organic Chemistry - Synthetic Organic Chemistry, E-2

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61467

Abstract: increase and decrease of amount of II yield of alkylate decreases.
The fraction BP 192-197° is oxidized with KMnO_4 yielding p-
 $\text{ClC}_6\text{H}_4\text{COOH}$ consequently main product of alkylation is p-
 $(\text{CH}_3)_2\text{CHC}_6\text{H}_4\text{Cl}$.

Card 2/2

KRENTSEL, B.A.

Catalytic chlorination of propene. B. A. Krentsel, A. V. Turchakov, and G. E. Al'ma. *Doklady Akad. Nauk S.S.S.R.* 110, 991-7 (1959); *Chem. Abstr.* 53, 14115b. Chlorination of C_3H_6 at 40-280° was studied in the presence of silica gel until with $CuCl_2$, Fe, or Ni oxides. Fe catalyst was most effective since it permitted a 20% conversion even at 40°. The activity of $CuCl_2-SiO_2$ was decidedly lower. Variation of space velocity from 60 to 260 at 250-40° failed to affect the yield and compn. of the products, which over Fe consisted of 72-80% monochlorides, 14-21% dichlorides, and 4-5% trichlorides with hydrocarbon-Cl ratio of 2:1 or 4:1; over $CuCl_2-SiO_2$, the yield of monochlorides was 22-49%, of dichlorides 38-44%, and of trichlorides 12-19%. Temp. above 300° caused extensive decompn. over SiO_2-CuCl_2 catalyst; over Fe increased temp. favored the formation of monochlorides. Addn. of 1-2% NO_2 to the mixt. (3:1 H_2 -Cl) resulted in acceleration of chlorination, the yield rising by as much as 20% over blank run with an empty tube. The catalysis might be due to the formation of $NOCl$ which decomposes yielding at. Cl. G. M. Kozolapoff

RM

KRENTSEL, B. A.

7
Polymerization of isobutylene in the presence of triethyl-
aluminum and titanium tetrachloride. A. V. Topchiev, B.
A. Krentsel, N. B. Bogomolova, and Ya. Ya. Goldfarb
Institute of Chemistry, Moscow. Doklady Akad. Nauk S.S.S.R.
111, 131-4 (1959).—When 1:2 Et₃Al-TiCl₄ is added to iso-
octane under complete exclusion of O₂, while a weak stream of
CH₂=CMe₂ is introduced into the mixt., the mixt. acquires a
yellow-brown color and passage of more CH₂=CMe₂ 9 hrs. re-
sults in polymerization of the latter. The yield at 75° was
about 32%, about 35% at 8°, and nearly 85% at -25°. A
small amt. of TiCl₄ added to AlEt₃ suffices to induce the poly-
merization. It is suggested that the polymer contains Me
sidechains at every 4th C atom (cf. Ziegler, C.A. 47,
2121d). G. M. Kosolapoff

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KRENTSEL, B.A.

AUTHOR: Krentsel', B.A., Candidate of Chemical Sciences 26-10-11/44

TITLE: Polypropylene a New Synthetic Material (Novyy sinteticheskiy material - polipropilen)

PERIODICAL: Priroda, October 1957, No 10, pp 81-84 (USSR)

ABSTRACT: Polypropylene - a stereoregular polyolefin - occupies one of the first places among modern synthetic materials. This is due to its easily accessible raw material and to its several eminent properties. Polypropylene is capable of forming fibres equal to the best synthetic fibres. Objects made from polypropylene, unless subjected to mechanical influence, preserve their forms in as high as 150° C. They can be used for numerous technical purposes as for manufacturing electric and radiotechnical appliances, transparent films, etc. The article contains 2 photos, 2 tables, 2 schematic drawings. The bibliography lists one Slavic reference.

ASSOCIATION: Petroleum Institute of the USSR Academy of Sciences (Institut nefi Akademii nauk SSSR), Moscow

AVAILABLE: Library of Congress
Card 1/1

KRENTSEL, B.A.

AUTHORS: Topchiyev, A. V., Krentsel', B. A., Perel'man, A. I., 7h-12-i/4 (Moscow).

TITLE: Polymerization of Olefins into High-Molecular Products by Means of Oxide Catalysts (polimerizatsiya olefinov v vysokomolekulyarnyye produkty na okisnykh katalizatorakh).

PERIODICAL: Uspekhi Khimii, 1957, Vol. 26, Nr 12, pp. 1355-1373 (USSR).

ABSTRACT: This paper contains all data concerning the catalytic effect of metal oxides in the polymerization of olefins. Oxides and mixed oxides of the VI., VII, and VIII. sub-group of the periodical system appear to be the most suitable. As carrier substances silicagel, kieselguhr, aluminosilicates, $\gamma\text{-Al}_2\text{O}_3$, and active coal are used.

Also aluminosilicates have a catalytic effect, as e. g. floridine. The catalytic properties found to exist at different conditions have been compiled from the passages referred to.

Nickel- and cobalt oxide catalysts, their production and possibilities of application are dealt with in the following.

A larger part of the paper deals with the catalytic effect of chromium oxide catalysts. A paper by T. Rode on the Cr - O .. phases is dealt with in detail (reference 25). The dependence of the molecular weight of the reaction products on pressure and temperature is gra-

Card 1/3

Polymerization of Olefins into High-Molecular Products by Means of Oxide Catalysts. 74-12-1/1

phically represented) the mechanic and chemical properties of the polymerides and mixed polymerides obtained of ethylene, propylene, etc. are compared in the table with other artificially produced substances as e. g. with polyvinylchloride and the American product marlex(marleks).

In the following molybdenum oxides and mixtures of molybdenum oxide with copper-, zinc-, nickel-, and cobalt- oxides are mentioned as catalysts and shortly discussed.

The effect produced by catalysts can be improved by the addition of metal hydrides. For this purpose the hydrides of alkalis and alkaline earths lithium "alkanate" and the boron hydrides of lithium, sodium, magnesium and aluminum. In connection with boron fluoride also metal fluorides can catalyze the polymerization reaction of the olefins.

Nothing exact is hitherto known concerning the mechanism of oxide catalysis; a comparison between the efficacy of the various oxides showed that the oxides of the V - VIII sub-group are particularly suited for this purpose. The catalyst effect can be considerably reduced by the treatment with hydrogen at 500°C. The ideas expressed by G. Natta (reference 37) concerning the mechanism of the polymerization reaction are given.

Card 2/3

Polymerization of Olefins into High-Molecular Products by Means of Oxide Catalysts. 71-12-1/1

There are 6 figures, 6 tables, and 73 references, 20 of which are Slavic.

AVAILABLE: Library of Congress.

1. Olefins-Polymerization
2. Metal oxides-Catalytic effects

Card 3/3

KRENTSEL, B.A.

Definitive chlorination of methane
A. V. Topolov, and L. M. Kosolapoff

S.S.R. 112, 7-8(1957). Passage of HCl and CH_4 over CuCl_2 -coated pumice (5-20%) effectively oxidizes HCl to Cl with elevation of temp. from 380 to 500° resulting in steady improvement in the oxidation, reaching finally over 80%; space velocity 82 gave 65% conversion whilst that of 216 gave 88% conversion of HCl . Chlorination of CH_4 by HCl and air over the above catalyst occurs best at 420-480°; at higher temps., much combustion oxidation occurs; the reaction was studied with various ratios of the components, with 114:10 CH_4 - HCl -air giving up to 82-80% chlorinated products and 21-30% products of combustion at 430-70°. Chlorination of CH_4 by air- Cl begins at 320° and gives max. results at 420-480° with max. conversion to chlorinated products being 60-60%. The best reactant ratio was found to be 1:2:8 CH_4 - Cl -air, the effluent contg. 65% CCl_4 .
G. M. Kosolapoff

111
111

KRENTSEV, B.A.

AUTHOR: TOPCHIEV, A.V., Member of the Academy, 20-1-31/64
KRENTSEV, B.A., TOLOHINSKIY, I.M., GARNISHEVSKAYA, G.V.
TITLE: On the Production of Crystalline Polypropylene by the Polymerization
of Propylene by Means of a Metal-Organic Catalyzer. (O poluchenii
kristalicheskogo polipropilena na metalloorganicheskom katalizatore,
Russian)
PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 114, Nr 1, pp 113-115
(U.S.S.R.)
ABSTRACT: The chemistry of polymeric compounds has recently been enriched by
new methods of polymerization which make it possible to obtain
stereoregular crystalline poly- α -olefines.
The papers hitherto published contain hardly any data concerning
the conditions of the synthesis of the polymerization products.
Experiments hitherto carried out show that in the case of polymeri-
zation under atmospheric pressure as well as at increased pressure
the best results were obtained (at a temperature of nearly 50°).
As may be seen from table 1, practically the same results were ob-
tained by working with pure and technical propylenes. The X-ray
picture of propylen disclosed the existence of sharp characteristic
rings of crystalline material. The microphotogram did not differ

Card 1/2

On the Production of Crystalline Polypropylene by the Polymerization
of Propylene by Means of a Metal-Organic Catalyzer.

20-1-31/64

from that of NATT.

Investigation of the infrared absorption spectrum of propylene
showed in the broad interval of temperatures the presence of strips
(characteristic in the case of amorphous metal parts), which in-
crease considerably by melting. (With 1 Table and 5 References).

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

KRENTSEL', B. A.

20-5-22/48

AUTHORS: Topchiyev, A. V. , Academician, Krentsel', B. A. , Il'ina, D. Ye.

TITLE: **Extensive** Chlorination of Propane on a Moving Contact (Glubokoye khlorirovaniye propana na dvizhushchemsya kontakte)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 5, pp. 800 - 803 (USSR)

ABSTRACT: In recent times there is a more and more increasing interest for the products of a thorough chlorination of hydrocarbons, especially of alkanes. Beside merely theoretical interest the polychlor-substitutes are used as semiproducts for the production of poisonous chemicals, artificial fibres, and others. It is known that a considerable heat liberation complicates the process of the reaction of alkane chlorination . This leads in a series of cases to a practical impossibility of the synthesis of the wanted chloride under industrial conditions. On the other hand, there is the possibility to carry out the chlorination on a moving chemically inert heat carrier as it is known from the petroleum working up. Due to a direct contact between the reagents and the heat carrier the reaction heat is comparatively easily conducted, the temperature regime of the process is conserved here. For this purpose a model device with a moving heat carrier ("mullite") was used. (figure 1). It runs in a closed cycle and is regenerated by the combustion of

Card 1/2

Extensive Chlorination of Propane on a Moving Contact

20-5-22/48

the carbon deposited on it. The experiments on the model device have shown that the yield of dichloride does not exceed 25 - 30 %. With the increase of the relation: chlorine: propane increases the degree of the pyrolysis. The characteristic of the products fractionated on a rectifying column is given in table 2. 1,1-, 1,2-, 1,3- and 2,2-dichloropropane, 1,1,2- and 1,2,3-trichloropropane, 1,1,1,2- and 1,1,2,2-tetrachloropropane were isolated and their physical-chemical indices were determined. Higher chlorides were not investigated. The results of the mentioned experiments on a moving heat carrier layer have shown that this process can be important for a thorough propane chlorination. Furthermore the reaction products can be used for the destructive chlorination for the production of tetrachlorocarbon and tetrachlorethylene. The moving heat carrier and a gradual introduction of chlorine are obviously the decisive factors which guarantee a normal course of the reaction in the case of a such thorough propane chlorination. There are 3 figures, 2 tables, and 3 references, none of which is Slavic.

SUBMITTED: July 20, 1957
 AVAILABLE: Library of Congress
 Card 2/2

KRENTSEL', B.A.

5(3)

PHASE I BOOK EXPLOITATION

SOV/1510

Topchiyev, Aleksandr Vasil'yevich, and Boris Abramovich Krentsel'

Poliiolefiny--novyye sinteticheskiye materialy (Polyolefins, New Synthetic Materials) Moscow, Izd-vo AN SSSR, 1958. 100 p. (Series: Akademiya nauk SSSR. Nauchno-populyarnaya seriya) 15,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Redkollegiya nauchno-populyarnoy literatury.

Ed. of Publishing House: K.G. Miyeserov; Tech. Ed.: T.P. Polenova.

PURPOSE: The book is intended for technically trained personnel interested in the manufacture of synthetic materials.

COVERAGE: The raw material used in the manufacture of polyolefins, methods of production, properties of polyolefins, and their uses are discussed in this book. No Soviet personalities or facilities are mentioned. No references are given.

Card 1/3

Polyolefins, New Synthetic Materials

80V/1510

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Polyolefins, New Synthetic Materials

80V/1510

Ch. VII. Processing of Polyethylene and Its Applications in the
National Economy

70

Ch. VIII. Polypropylene, a New Synthetic Material; Its Production
Properties and Uses

85

AVAILABLE: Library of Congress

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Card 3/3

KRENTSEL, B.A.

KARGIN, V.A.
5(3) 64
Akademiya nauk SSSR.
Kniha bol'shikh molekul; sbornik statei (Chemistry of Large Molecules; Collection of Articles) Moscow, izdat. AN SSSR, 1958. seriya) 30,000 copies printed.
Compiler: G.V. Sklovskiy; Resp. Ed.: A.V. Topchiyev, Academician; Ed. of Publishing House: V.A. Boyarskiy; Tech. Ed.: I.M. Guseva.
PURPOSE: This book is intended for a wide circle of readers including those who have had no training in chemistry. It can also serve as a manual for propagandists, teachers, and journalists.

Card 1/8

Chemistry of Large Molecules (Cont.)
SOV/1599
COVERAGE: This collection of articles reflects the trend for the future development of the Soviet chemical industry as indicated by the May plenary session of the Central Committee of the Communist Party within the framework of the new Seven Year Plan. These articles were published in newspapers and journals. The authors, scientists and industry workers, described the theme of accelerated development of chemical synthetic fibers, plastics, and other materials. Some of the articles were selected, revised, or enlarged. The articles were selected so as to give an adequate survey of the chemistry and technology of high-molecular-weight compounds and their use in industry, agriculture, and in the manufacture of consumers' goods. Mentioned are materials for the production of polymers. This book belongs to the popular-science series of the Academy of Sciences. Similar volumes are intended for future publication. No references are given.

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Preface

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Card 5/8	

KRENTSEL, B. A., PERELMAN, A. I. MIYESSEROV, K. G., and TOPCHIEV, A. V.,

"On the Question of Applying Chromium Oxide or Molybdenum Oxide Catalysts to Obtain Crystalline Poly- α -olefins," paper no. K8. submitted at the International High-Polymer Conference, Nottingham 21-24 July 1958.

Akademiya Nauk SSSR, Leninskiy Prospekt 14, Moscow, USSR

KRENTSEL, B.A.

AUTHOR: Krentsel', B.A., Candidate of Technical Sciences 25-58-3-4/41

TITLE: Basis of Organic Synthesis (Osnova organicheskogo sinteza)

PERIODICAL: Nauka i Zhizn', 1958, Nr 3, pp. 12-16 (USSR)

ABSTRACT: Various chemical processing methods of petroleum hydrocarbon are described and the importance of the process of polymerization is emphasized. Recently, scientists developed a new synthetic method of obtaining ethyl alcohol from ethylene. Ethylene is distilled under a pressure of 70 atmosphere and a temperature of 250°C under the influence of an acid catalyzer. In 1957, the Sumgait plant produced dozens of tons of synthetic ethyl alcohol. Besides alcohols, synthetic fatty acids obtained from petroleum are of great importance for the chemical industry. Soviet engineers and scientists elaborated a new method of oxidizing petroleum paraffin into fatty acids; this process is carried out by using liquid paraffin hydrocarbons. With the help of chemical petroleum syntheses, one of the most important tasks of Soviet national economy is being solved. Foodstuffs which were formerly used for technical purposes will be completely replaced by synthetic products. Soviet scientists were the first to find a new industrial method of

Card 1/2

Basis of Organic Synthesis

25-58-3-4/41

obtaining phenol and acetone simultaneously from isopropyl benzene. Moreover, the chemical synthesis of petroleum represents a valuable source for organic dyestuffs. An extensive research program is being carried out in Soviet research laboratories to obtain new materials of stereo-regular structures with even more valuable combination properties than polypropylene and polyethylene. There are three sketches and one illustration.

AVAILABLE: Library of Congress

Card 2/2 1. Petroleum-Synthesis 2. Polymerization-Processes

AUTHORS: Topchiyev, A. V., Tolchinskiy. I. M. 62-58-3-26/30
Krentsel', B. A.

TITLE: On the Possibility of the Polymerization of Ethylene in Polyethylene ~~Into~~ the Presence of Lithiumhydride, Aluminumhaloid and Titanium Tetrachloride (O vozmozhnosti polimerizatsii etilena v polietilen v prisutstvi litiygidrida, alyuminiygaloida i chetyrekhkhlorigo titana)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk, 1958, Nr 3, pp. 375-376 (USSR)

ABSTRACT: Tsigler in his works maintained, that in heating ethereal solutions of lithium-aluminumhydride with ethylene (at a temperature of 180-200°C) a mixture of α -olefines is formed under pressure: butene, hexene, decene and dodecene. Corresponding to experimental data it is to be expected that the actual catalyst in this case is tetraethyl-lithium-aluminum. The latter is formed in consequence of the interaction of ethylene with lithiumaluminumhydride

Card 1/2
$$\text{LiAlH}_4 + 4\text{C}_2\text{H}_4 \rightarrow \text{LiAl}[\text{C}_2\text{H}_5]_4$$
 . A formation of high-

On the Possibility of the Polymerization of Ethylene in 62-58-3-26/30
Polyethylene in the Presence of Lithiumhydride, Aluminumhaloid
and Titanium Tetrachloride

molecular polymers of ethylene was not observed. It was of interest to produce triethylaluminum simultaneously as well as to obtain a polymerization of ethylene to polyethylene. The experiments were carried out in the autoclave in the medium of an inert solvent. It was shown that it is possible to produce polyethylene in the presence of lithiumhydride, aluminumhalides and titanium tetrachloride. Besides, there exists the possibility of a reaction as well as of a production of polypropylene by means of the same method. There is 1 reference, which is Soviet.

ASSOCIATION: Institut nefti Akademii nauk SSSR
(Institute of Petroleum, AS USSR)

SUBMITTED: October 28, 1957

Card 2/2

KRENTSEL, B. A.

AUTHORS:

Krentsel', B. A., Topchiyev, A. V.,
Sidorova, L. G.

62-58-4-18/32

TITLE:

Synthesis of Crystalline Polypropylene by Means
of Polymerisation of Technical Propylene With Triiso-
butylaluminum and Titanium Tetrachloride (Polucheniye
kristallicheskego polipropilena polimerizatsiyei tekhnicheskogo propilena s triizobutilaluminiumom i chetyrekhkhloristym titanom)

PERIODICAL:

Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh
Nauk, 1958, Nr 4, pp. 500-501 (USSR)

ABSTRACT:

In periodicals numerous reports have been published
of late, concerning a new high-polymeric material:
stereo-regular polypropylene. The latter was produced
by the polymerisation of propylene in the presence of
the complex organometallic catalyst $Al(C_2H_5)_3 + TiCl_4$.

It was of interest to use instead of the greatly pyrophoric triethylaluminum especially high-molecular and less inflammable aluminum alkyls. In the present paper the authors describe the carried out polymeri-

Card 1/2

Synthesis of Crystalline Polypropylene by Means of 62-58-4-18/32
Polymerisation of Technical Propylene With Triisobutylalu-
minum and Titanium Tetrachloride

sation of propylene in so high crystalline polypro-
pylene in the presence of a complex organometallic
catalyst, $(Al(iC_4H_9)_3 + TiCl_4)$ which is much less
inflammable than $Al(C_2H_5)_3 + TiCl_4$.

There are 3 figures.

ASSOCIATION: Institut nefti Akademii nauk SSSR (Petroleum
Institute, AS USSR)

SUBMITTED: October 20, 1957

AVAILABLE: Library of Congress

1. Propylene--Polymerization 2. Organometallic
catalyst $(Al(iC_4H_9)_3 + TiCl_4)$ --Applications

Card 2/2

AUTHORS: Topchiyev, A. V., Krentsel', B. A., Sidorova, L. G. SOV/62-58-9-21/26

TITLE: Letters to the Editor (Pis'ma redaktoru)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1958, Nr 9, pp 1133 - 1133 (USSR)

ABSTRACT: Of late in publications several references were made in publications in regard to the mechanism of the stereospecific polymerization of the α -olefins. In regard to these references the authors of this letter wish to report some experimental data gathered in investigations on the polymerization reaction of propylene in the presence of the catalytic system TiCl_4 and $\text{Al}(\text{i-C}_4\text{H}_9)_3$.

Card 1/2 Studies on the change in molecular weight of the polypropylene formed in the reaction show that already 15 seconds after the reaction begins a product of high molecular weight has formed. The duration of the reaction does not change the molecular weight of the polymer formed. The structural chain keeps adding polymeric units in a chain reaction during the polymerization, as indeed the

Letters to the Editor

SOV/62-53.2-21/26

results of several experiments carried out by the authors showed that the propylene polymerization is a chain reaction. At the present the authors are concerned with further investigations on the mechanism and the function of the catalytic metallo-organic complex in the propylene polymerization and in the polymerization of other α -olefins.

ASSOCIATION: Institut nefiti Akademii nauk SSSR (Petroleum Institute, AS USSR)

SUBMITTED: May 29, 1958

Card 2/2

17-16-10-2/51

AUTHORS: Topchiyev, A.V., Academician; Krasnol, B.I., Candidate of Technical Sciences

TITLE: The Chemical Synthesis of Petroleum (Neftekhimicheskiy sintez)

PERIODICAL: Priroda, 1958, ¹¹Nr. 10, pp 9-15 (USSR)

ABSTRACT: The history and process of cracking is described. Apart from liquid petroleum, natural and by product gases represent a valuable source of raw material. In 1958, the USSR will obtain 9 billion cu m of by-product gas. In 1965, 2.5 million tons of liquid hydrocarbons obtained from these gases will be used in the chemical industry. Basic research into refining processes has been carried out by V.V. Markovnikov, N.D. Zelinskiy, S.S. Nametkin, etc. although the properties of the various fractions have still been insufficiently studied. New research methods being used are: spectrum analysis in the infra-red and ultra-violet absorption bands; mass spectrometry; magnetic resonance; etc. For obtaining pure fractions needed for the manufacture of synthetic fibers and products, low-temperature rectification (sometimes combined with absorption), is used. Recently, hypersorption the adsorptiionary breaking down of hydrocarbons in the moving

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layer of an adsorbent - has found a wide application. The author explains the purpose of the various refining processes, their application and the substances produced:

1) Oxidation: the USSR recently devised a method for the oxidation of hydrocarbons by the continuous process using readily available liquid paraffine. The author also predicts a bright future for the method of oxidizing liquefied hydrocarbon gases at near critical temperatures and pressures using gas inductors. By this method, common butane can be broken selectively into acetic acid and methyl-ethyl-ketone. The Gosudarstvennyy institut azotnoy promyshlennosti (The State Institute for the Nitrate Industry) has put forward a combined scheme for processing by-product gases. In the first stage of the process methanol, acetaldehyde and formaldehyde are obtained. The remaining gases are converted by high-pressure processing in the second stage into a synthesis-gas for obtaining synthetic ammonium. 2) Chlorination: a group of Soviet scientists, headed by Academician A.N. Nesmeyanov have devised a method of obtaining hydrocarbon tetrachloride by the chlorination of methane (natural gas). The hydrocarbon tetrachloride is used in the manufacture of a new, very strong, artificial fiber - ENANT. The production

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of hydrocarbon fluoride derivatives still necessitates intermediate synthesis of appropriate hydrocarbon chlorides. Their uses in industrial production are listed, e.g. tetrafluoroethylene, the initial compound from which polytetrafluoroethylene (TEFLON) polymer material is produced. Nitration, alkylation and polymerization are discussed. The USSR Academy of Sciences is carrying out research into the process of the polymerization of ethylene using organic metal and oxide catalysts. The radiation polymerization of ethylene, propylene, etc, has a great future. Analysis of alkane radiolysis sheds valuable light on the nature of the hydrocarbon processes.

There are 2 schematic diagrams.

ASSOCIATION: Institut nefti Akademii nauk USSR (Petroleum Institute of the USSR Academy of Sciences - Moscow)

1. Petroleum--Synthesis

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SOV/63-3-6-23/43

AUTHORS: Markevich, V.A., Krentsel, B.A., Candidates of Chemical Sciences, Okhlobystin, O.Yu.

TITLE: Conference on Metal-Organic Syntheses (Soveshchaniye po metalloorganicheskim sintezam)

PERIODICAL: Khimicheskaya nauka i promyshlennost'. 1958. Vol III, Nr 6, p 821 (USSR)

ABSTRACT: In June 1958 a scientific-technical conference took place in Moscow dealing with metal-organic syntheses of alcohols, monomers, acids, etc. The conference was attended by 50 specialists from 16 different organizations. The following papers were presented: O.Yu. Okhlobystin, L.I. Zakharkin, Institute of Element-Organic Compounds, "The Use of Aluminum-Organic Compounds for the Synthesis of Other Element-Organic Compounds"; V.V. Gavrilenko, L.I. Zakharkin, Institute of Element-Organic Compounds, "Synthesis of Carbonic Acids and Alkylhalides on the Basis of Aluminumtrialkyls"; I.M. Khorlina, L.I. Zakharkin, Institute of Element-Organic Compounds, "Production of Aldehydes From Nitryls and Peuble-Decomposed Amides by Diisobutyl-Aluminumhydride Reduction"; V.M. Lisitsin, State Committee for Chemistry of the USSR Council of Ministers,

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Conference on Metal-Organic Syntheses

SOV/86-3-6-86/45

"Study of the Possibility of Industrial Production of Tetraethyl-Lead by the Electrolysis of Complex Compounds of Triethyl-Aluminum"; I.V. Garmenov, K.M. Chevychalova, All-Union Scientific Research Institute of Synthetic Rubber, "Synthesis of 2-Methyl-butylene-1 and 3-Ethylbutene-1 on the Basis of Propylene, α -Butylene and Ethylene With the Application of Triethyl-Aluminum"; M.I. Parberov, S.I. Kryukov, A.M. Kut'in, "Selective Dimerization of Propylene and Its Use in Technical Syntheses"; A.M. Sladkov, V.A. Markevich, Scientific Research Institute of Synthetic Alcohols and Organic Products, "Production of Higher Alcohols From Organic Compounds of Aluminum". It has been recommended to install an experimental-industrial plant for the production of simple alkyls and pure suspended aluminum which are needed for metal-organic synthesis and which are not available in the necessary quantities. Colloquia should be arranged at intervals of 3 - 4 months.

Gr: 2/2

20-118-5-23/59

AUTHORS: Andeyevskiy, D. N., Krentsel', B. A.
Topchiyev, A. V., Member of the AS USSR.

TITLE: On the Thermodynamics of the Hydrochlorination Reaction of
Isobutylene (K voprosu o termodinamike reaktsii gidrokhloriro-
vaniya izobutilena)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 5,
pp. 931-934 (USSR)

ABSTRACT: These reactions are equiponderant for unsaturated hydrocarbons.
The thermodynamic calculation of the reaction mentioned in the
title above is interesting. It is also of essential practical
importance for the choice of the optimum parameters of the pro-
cess. The authors give a short bibliography (references 1-3).
At present the possibilities of a rigorous thermodynamic compu-
tation of the reaction mentioned in the title are given, that
is by using the molecular and spectroscopic data for tertiary
butylchloride. Its molecule has a symmetry of the class C_{3v} .

Card 1/4 It can be regarded as a C-Cl frame to which 3 symmetric $-CH_3$
gyroscopes are fixed. As the rotation of the methyl groups does

On the Thermodynamics of the Hydrochlorination
Reaction of Isobutylene

20-118-5-23/59

not change the main moments of inertia for simplification the "shaded" model of the molecule was chosen that is, a C-H combination of each methyl group was regarded as being in the same plane as the C-C combination. With chosen angles and distances between the atoms (both given here) the atom coordinates show results which are given in table 1. The "z" axis coincides with the direction of the C-C combination. From that the moments of inertia of the whole molecule are computed. Their product $I_x I_y I_z = 1,400.10^{-113}$. The value of the molecular weight (92 569) and the last-mentioned product render it possible to compute the corresponding terms of the entropy of the free energy and of other thermodynamic functions of one mole of the respective gas in dependence on the temperature. For the entropy and for the free energy formulae (1) and (2) are derived. From these the values of the thermodynamic functions were computed which are caused by all progressive rotary motions (those of the CH₃ gyroscopes included) and by the oscillating motions of the molecules (table 2). These functions were computed with a potential of 2000 Kal per Mole which accords best with the experimental data (reference 1) with regard to the corrections because of the retardation of the rotation of the methyl groups. By combining the value

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On the Thermodynamics of the Hydrochlorination
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of ΔH° - E° from the table 2 for tertiary butylchloride
298,16 with the heats of formation of isobutylene and HCl, and the
hydrochloration heat of isobutylene (according to reference 1)
for the respective substance ΔH° Cal and E° Cal per mole are
obtained. In order to control the values thus obtained the free
energies and the equilibrium constants of the reaction $i-C_4H_8 +$
 $HCl \rightleftharpoons$ tertiary C_4H_9Cl were computed. The data for the choice of
the potential level, as computed for 400°K were taken from refe-
rence 1. Table 3 shows the results together with the values for
 ΔF° with a potential of 3000 Cal per mole for several tempera-
T
tures. They show that there is a good correspondence in a wide
range (300°K - 1000°K) for other temperatures as well. For the
range from 300°K to 500° with intervals of 50° the composition
of an equiponderant mixture for $i-C_4H_8 + HCl$ in a 1.1 ratio was
calculated, and also at a pressure of 1 atmosphere excess pressu-

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re and of 20 atmospheres excess pressure (table 4). The results
thus calculated correspond well to the experimental results as
are treated above.
There are 4 tables, and 6 references, 2 of which are Soviet.

SUBMITTED: February 22, 1957.

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Card 4/4

KRUMHOLTZ, D. A., TOPCHIEV, A. V.

"Some Regularities of Polymerization of α -Olefins on Complex Metal-Organic and Oxide Catalysts."

Report submitted ^{by} the Fifth World Petroleum Congress, 30 May - 5 June 1959. New York.

KRENTSEL', B. A.: Doc Chem Sci (diss) -- "Investigation of the chlorination of gaseous paraffin hydrocarbons and certain transformations of alkyl chlorides". Moscow, 1959. 20 pp (Inst of Petroleum-Chem Synthesis of the Acad Sci USSR), 120 copies (KL, No 14, 1959, 113)

SOV/62-59-2-35/40

5(3)

AUTHORS:

Topchiyev, A. V., Krentsel', B. A., Perel'man, A. I.,
Smetanyuk, V. I.

TITLE:

Polymerization of Ethylene on the Chromium-oxide Catalyst at
Atmospheric Pressure and in the Absence of a Solvent
(Polimerizatsiya etilena na okisnokhromovom katalizatore pri
atmosfernom davlenii i v otsutstviye rastvoritelya)

PERIODICAL:

Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk,
1959, Nr 2, pp 365-366 (USSR)

ABSTRACT:

The authors report in the present news in brief that they suc-
ceeded in obtaining polyethylene on the chromium-oxide catalyst
at atmospheric pressure and without a solvent at 110-180°. The
yield of the polymer depends on temperature and on the time of
contact of ethylene with the catalyst (Figs 1,2). A polymer
with the melting point of 123-137° and h_x 0.4 - 0.5 was ob-
tained. Low-molecular (liquid) reaction products could not be
detected. On the polymerization of ethylene without pressure
but in the presence of a solvent no polymer was formed. The
oxygen content in ethylene (0.3-0.4%) did not influence poly-

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Polymerization of Ethylene on the Chromium-oxide Catalyst at Atmospheric Pressure and in the Absence of a Solvent

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merization; at pressure, on the other hand, and in the presence of the solvent (according to data of publications) the admissible quantity of oxygen is considerably smaller. Under identical conditions also polypropylene was obtained. It could be found that on polymerization under pressure and in the presence of a solvent the activity of the chromium-oxide catalyst is connected with the presence of chromium-oxides of the valences between Cr^{VI} and Cr^{III} . The chromium-oxide catalyst which contained only Cr_2O_3 without Cr^{VI} also did not polymerize ethylene and propylene in experiments without pressure and solvent. There are 2 figures and 3 references, 2 of which are Soviet.

ASSOCIATION: Institut nefiti Akademii nauk SSSR (Petroleum Institute of the Academy of Sciences, USSR)

SUBMITTED: July 15, 1958

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5(3)

SOV/62-59-2-38/40

AUTHORS:

Topchiyev, A. V., Krentsel', B. A., Gol'dfarb, Yu. Ya.

TITLE:

Letter to the Editor

PERIODICAL:

Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1959, Nr 2, p 369 (USSR)

ABSTRACT:

In the present letter to the editor the authors write: As is known, heterocyclic compounds which are usually among the aromatic systems exhibit the properties of dienes up to a certain extent. This becomes especially manifest in compounds of the furan series which are able to combine with maleic acid anhydride. Less distinct becomes this fact in the case of thiophene. In this connection the possibility of a polymerization of such compounds in the presence of a complex organometallic catalyst which contained trialkyl aluminum and titanium tetrachloride was investigated. A number of experiments showed that furan, α -methyl furan and thiophene in n-hexane form solid compounds in the presence of the catalyst mentioned. These compounds are practically insoluble in aliphatic and aromatic hydrocarbons. The product obtained from furan remains unchanged on heating up to 320°. The product formed from α -methyl furan

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Letter to the Editor

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does not change up to about 260° . Thiophene polymerized under similar conditions forms a solid polymer that melts at $\approx 180^{\circ}$. The elementary analysis of poly- α -methyl furan shows the following characteristic data:

Found %:	C 72.62; 72.59;	H 7.64; 7.76
Calculated %:	C 73.17	H 7.31

As to the products formed from non-substituted furan and thiophene, it has not been possible so far to obtain analytically pure samples. The investigations are being continued.

ASSOCIATION: Institut nefiti Akademii nauk SSSR (Petroleum Institute of the Academy of Sciences, USSR)

SUBMITTED: November 14, 1958

Card 2/2

ERRENTSEL', B. kand. tekhn. nauk

Fluorinated plastic materials. IUn. tekhn. 2 no. 8:33-34 Ag '59.
(Plastics) (MIRA 12:7)

15(8)

SOV/25-59-3-11/46

AUTHOR: Krentsel', B.A., Candidate of Technical Sciences

TITLE: Polyolefins (Poliolefiny)

PERIODICAL: Nauka i zhizn' 1959, Nr 3, pp 31 - 34 (USSR)

ABSTRACT: The author stresses the importance of polyolefins, especially of polyethylene and polypropylene, and their wide field of application in industry and agriculture. He describes the synthetic process of obtaining these polymers, their basic properties and advantages and gives many examples of their use, e.g. as tubes (replacing metal ones), as covers for foodstuff and sheltering building material, in medical science as well as in textile industry, as cables and special containers, etc. As research on making new polymers is being continued, there are good prospects for better and cheaper products in the future. In 1965, a total of 24,000 tons of polyethylene tubes will be produced. There are 3 sketches.

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5 (3,4)

AUTHORS: Topchiyev, A. V., Krentsel', B. A., SOV/62-59-6-20/36
Perel'man, A. I., Rode, T. V.

TITLE: Chromium Oxide Catalysts for the Polymerization of Ethylene
(Okisnokhromovyye katalizatory dlya polimerizatsii etilena)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk,
1959, Nr 6, pp 1079 - 1087 (USSR)

ABSTRACT: By way of introduction the chromium oxide catalysts which are successfully used for the polymerization, and which are mentioned in publications are enumerated. (Refs 1-4,5). The strong catalytic effect exercised by these catalysts is based upon the readiness of chromium to pass over from one valence stage into another. In the present investigation the composition, the physico-chemical properties, and the dependence of the activity upon the production method of the catalysts, which were produced by impregnation of the aluminum silicate with CrO_3 and chromium nitrate with successive activation at high temperatures, was investigated. Chromium, which is otherwise reduced at high temperatures from $\text{Cr}^{(\text{VI})}$ to $\text{Cr}^{(\text{III})}$ remains in aluminum

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Chromium Oxide Catalysts for the Polymerization of
Ethylene

SOV/62-59-6-20/36

silicate almost completely as Cr^{VI} . This was proved by investigating the thermogram of the catalysts (method according to Balandin and Rode Ref 6), which exhibited an exothermal effect (Tables 2,3) which is caused by the interaction of CrO_3 and aluminum silicate, and by which the Cr^{VI} on aluminum silicate when heating to 350° is preserved. The dependence of the activity of the catalyst was investigated with an aluminum silicate which was impregnated at first with CrO_3 and then with chromium nitrate. Apart from the chemical analysis also the weight, the specific weight, and the porosity of the catalyst was determined. Its activity was determined by the quantity of the solid polymer formed. Furthermore, the influence of the activation temperature on the composition of the catalyst was studied. (Table 1). Here it was found that the lower the activation temperature is (300°), the higher is the portion of Cr^{VI} . The catalyst, however, remains inactive because of the water still combined with the aluminum silicate. The activation temperature had therefore to be chosen in such a way that the de-

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Chromium Oxide Catalysts for the Polymerization of
Ethylene

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hydration of the aluminum silicate took place while on the other hand the Cr^{VI} content in the catalyst remained almost unreduced. This was possible in a vacuum at 350° . Furthermore, a connection between the beginning of the active effect of the chromium catalyst and the formation of intermediate chromium oxides at 350° was found. Finally, the influence exerted by carrier substances on the activity of the chromium catalyst was investigated, and experiments with aluminum silicate, silica gel, aluminum oxide, and activated coal were carried out. Aluminum silicate and silica gel proved to be the best carriers for CrO_3 . The action of chromium catalysts as polymerizers is based upon their high sorption capability and the readiness of being reduced under the influence of high temperatures and in presence of hydrocarbons. The regeneration of the catalysts was also investigated. There are 7 figures, 5 tables, and 6 references, 2 of which are Soviet.

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Chromium Oxide Catalysts for the Polymerization of Ethylene SOV/62-59-6-20/36

ASSOCIATION: Institut nefiti Akademii nauk SSSR (Petroleum Institute of the Academy of Sciences, USSR)

SUBMITTED: October 4, 1957

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5(3)

SOV/62-59-7-35/39

AUTHORS: Topchiyev, A.V., Perel'man, A. I., Smetanyuk, V. I.,
Krentsel', B. A.

TITLE: The Synthesis of Polypropylene on Chromium Oxide Catalyst (Polu-
cheniye polipropilena na okisno-khromovom katalizatore)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk,
1959, Nr 7, pp 1346-1349 (USSR)

ABSTRACT: A brief introduction is given concerning the data found in publi-
cations concerning the production of the compound mentioned in
the title with chromium oxide catalysts (Refs 1-4). The present
paper deals with the investigation of the influence on the poly-
merization of propylene on chromium oxide by the addition of
 $Al(alkyl)_3$. The experiments were carried out by A.N. Tsyba at the
Institute mentioned in the Association. Without addition of
 $Al(alk)_3$ 90% crystalline polypropylene was obtained with but a low
yield. The reaction in an autoclave took place at a temperature of
105° and a pressure of 25-30 atm and lasted 4-5 hours. The poly-
mers obtained were investigated radiographically and thermomecha-

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The Synthesis of Polypropylene on Chromium Oxide
Catalyst

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nically. The thermomechanical analysis was made by I. Yu. Marchenko. The table shows the characteristics of the polymers and secondary products. The yield of solid polymer was found to increase with rising ratio Al/Cr (Fig 1). Thermomechanical investigations further revealed that the polypropylene obtained is a solid crystalline substance at 130⁰, whereas it becomes viscous at temperatures of 150⁰. There are 2 figures, 1 table, and 6 references, 3 of which are Soviet.

ASSOCIATION: Institut nefiti Akademii nauk SSSR (Institute of Petroleum of the Academy of Sciences, USSR)

SUBMITTED: January 19, 1959

Card 2/2

'5 (3)

AUTHORS:

Andreyev, L. N., Krentsel', B. A., SOV/62-59-8-38/42
Litmanovich, A. D., Polak, L. S., Topchiyev, A. V.

TITLE:

On the Radiation Synthesis of the Copolymer of Akrylonitrile
With Propylene

PERIODICAL:

Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk,
1959, Nr 8, p 1507

ABSTRACT:

As is known, gaseous olefines do not easily polymerize under the influence of γ -rays. The authors proved this fact also for propylene, which does not polymerize in a condensed state at room temperature and a radiation dose of $\sim 5.0 \cdot 10^6$ roentgen. It was tried to copolymerize the easily polymerizing akrylonitrile with propylene under the influence of γ -rays. The mixture of the two monomers was subjected to an integral radiation dose of $3.5 \cdot 10^6$ roentgen (γ -Co⁶⁰). The product obtained was extracted successively with dimethylformamide, n-heptane, and ether. The percentage of propylene links in the copolymer was determined from the elementary analysis of the remaining residue. At a change of the weight ratio of propylene and akrylonitrile from 0.75 to 0.15 the percentage of propylene links in the copolymerize

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On the Radiation Synthesis of the Copolymer of
Akrylonitrile With Propylene

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decreases from 26 to 12%. The same copolymer was obtained by thermal copolymerization in the presence of benzoylperoxide at 75°. In this case the percentage of propylene links in the copolymer at a weight ratio propylene : akrylonitrile = 0.3 was 17%. There is 1 reference.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute of Petroleum-chemical Synthesis, Academy of Sciences,
USSR)

SUBMITTED: May 20, 1959

Card 2/2

VOLKOVA, N.S.; KHUTAREVA, G.V.; KRENTSEL', B.A.; POGOVIN, Z.A.;
TOPCHIEV, A.V.

Synthesis and study of stereoregular propylene - isoprene
copolymers. Vysokom.sosed. 1 no.12:1758-1763 D '59.
(MIRA 13:5)

1. Moskovskiy tekstil'nyy institut i Institut neftekhimicheskogo
sinteza AN SSSR.
(Propene) (Isoprene)

5(3)

AUTHORS:

Topchiyev, A. V., Academician, SOV/20-124-6-20/55
Krentsel', B. A., Pokatilo, N. A., Yerasova, Ye. L.

TITLE:

On the Polymerization of α -Butene With a Complex Metallo-organic Multi-purpose Catalyst $\text{Al}(\text{C}_2\text{H}_5)_3 + \text{TiCl}_4$ (O poli-merizatsii α -butena s kompleksnym metalloorganicheskim katalizatorom $\text{Al}(\text{C}_2\text{H}_5)_3 + \text{TiCl}_4$)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 6,
pp 1255-1257 (USSR)

ABSTRACT:

Since recently the problems of stereospecific polymerization of α -olefins with complex metallo-organic catalysts have attracted the attention of many research workers. This can be explained by the theoretical interest in polymerization reactions which yield stereoregular polymers on the one hand, and by valuable technical properties of the products formed, on the other hand. The mechanism of stereospecific polymerization of α -olefins and the properties of the polymers were frequently the subject of publications (Refs 1-8). Least attention in the discussion was paid to the synthesis of polymers with a high molecular weight on the α -butene

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On the Polymerization of α -Butene With a Complex SOV/20-124-6-20/55
Metallo-organic Multi-purpose Catalyst $\text{Al}(\text{C}_2\text{H}_5)_3 + \text{TiCl}_4$

basis (Refs 5-8). This is what induced the authors to write the present paper. In an experimental part they deal with the production of the initial substance, course, duration, and details of the reaction as well as with the quantity of the catalyst used. The ready polymer is described with respect to its properties. Figure 1 shows the dependence of the polybutylene yield upon the duration of reaction. Figure 2 gives the radiograms of amorphous (a) and crystalline (b) polybutylene. From figure 3 the dependence of the characteristic viscosity of polybutylene (A) can be seen and that of the content of crystalline substances (B) on the molecular ratio of the catalyst $(\text{C}_2\text{H}_5)_3\text{Al} : \text{TiCl}_4$. Figure 4 reveals the dependence of the same³viscosity⁴(A) and the yield in polybutylene upon the reaction temperature. There are 4 figures and 9 references, 3 of which are Soviet.

SUBMITTED: November 13, 1958

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5 (2,3)

AUTHORS:

Topchiyev, A. V., Academician,
Krentsel', B. A., Sidorova, L. G.

SOV/20-128-4-27/65

TITLE:

Some Rules of Polymerization of Propylene With the $TiCl_4 + AlR_3$
Catalytic System

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 4, pp 732 - 735
(USSR)

ABSTRACT:

Different opinions were expressed in publications on the rules and mechanism of stereospecific polymerization of α -olefines. Many problems in this respect have, however, remained unclear. Therefore, some observations made by the authors in dealing with the subject mentioned in the title are interesting. ($AlR_3 = Al(Iso-C_4H_9)_3$). The experimental system had been described before (Ref 5). It can be assumed that an exchange reaction takes place between $TiCl_4$ and the metallic alkyl forming organotitanium compounds (Ref 6). The latter decompose due to their instability, and form free radicals. The polymerization of styrene, for instance (Ref 7), can be initiated in this way. The organotitanium compound acts as a catalyst while the metal-

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Some Rules of Polymerization of Propylene With the
 $TiCl_4 + AlR_3$ Catalytic System

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lic alkyl is, so to speak, a "supplier" of the alkyl radical. The propylene polymerization is a chain reaction. Already 17 seconds after its start, a polymer with a high molecular weight is formed (Fig 1) which remains unchanged for a long time (up to 1.5 hours). Thus, the molecule attains a maximum size, and does not grow any more. The catalytic activity of the complex catalysts of the Tsigler type decreases with time (Fig 2). This is possibly due to the fact that the amount of resulting organotitanium compounds is reduced with an increasing alkylation of titanium chlorides. Accordingly, the absorption rate of propylene also decreases. If, however, $TiCl_4$ is first poured into the reactor, and then aluminum alkyl evenly added at a low rate, e.g. within 3 hours, the activity of the catalyst is maintained for a long time, and the polymer yield is considerably increased. An explanation of these phenomena is attempted with reference to the assumption made by C. D. Nenitzescu (Ref 4). The polymerization process initiated by Tsigler catalysts is highly sensitive to admixtures of various types in the monomer, particularly to oxygen (Fig 3).

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